

0.0 GENERAL DESCRIPTION

The CORE field plot consists of four subplots approximately 1/24 ac in size with a radius of 24.0 ft. The center subplot is subplot 1. Subplots 2, 3, and 4 are located 120.0 ft horizontal at azimuths of 360, 120, and 240 degrees, respectively from the center of subplot 1. See Figure 1. Subplots are used to collect data on trees with a diameter (at breast height "DBH", or at root collar "DRC") of 5.0 in or greater. Throughout this manual, use of the word 'plot' refers to the entire set of four subplots. "Plot center" is defined as the center of subplot 1.

Each subplot contains a microplot of approximately 1/300 ac in size with a radius of 6.8 ft. The center of the microplot is offset 90 degrees and 12.0 ft horizontal from each subplot center. Microplots are numbered in the same way as subplots. Microplots are used to select and collect data on saplings (DBH of 1.0 in to 4.9 in) and seedlings (DBH less than 1.0 inch in diameter and greater than 0.5 ft in length (conifers) or greater than 1.0 ft in length (hardwoods)). Longleaf pine must be at least 0.5 in at the root collar. Planted seedlings must meet the same size requirements as listed above.

Data are collected on field plots at the following levels:

Plot	Data that describe the entire cluster of four subplots.
Subplot	Data that describe a single subplot of a cluster.
Condition Class	A discrete combination of landscape attributes that describe the environment on all or part of the plot. These attributes include CONDITION STATUS, RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS, and TREE DENSITY.
Boundary	An approximate description of the demarcation line between two condition classes that occur on a single subplot, microplot, or annular plot. There is no boundary recorded when the demarcation occurs beyond the fixed radius plots.
Tree	Data describing saplings with a diameter 1.0 in to 4.9 in, and trees with diameter \geq 5.0 in
Seedling	Data describing trees with a diameter < 1.0 inch and \geq 0.5 ft in length (conifers) or \geq 1.0 ft in length (hardwoods). Longleaf pine must be at least 0.5 in at the root collar. Planted seedlings must meet the same size requirements as listed above.
Site Tree	Data describing site index trees.

0.1 PLOT SETUP

Mark each subplot and microplot center with a wire pin. Bend the pin at the subplot center in a “horseshoe” shape. The center of the bend represents subplot center. Bend the pin at the microplot center in a “pig tail” shape. Place pins at all subplot and microplot centers that contain an accessible forest condition, even if there is no tally on the subplot or microplot.

Plots will be established according to the regional guidelines of each FIA program. In cases where the plot center cannot be occupied due to safety hazards, lack of access, or when the plot center is out of the sample, but some of the subplots can be occupied and are in the sample, those subplots which can be established should be established and sampled according to normal procedures. In cases where a subplot or microplot center cannot be occupied no data will be collected from that subplot or microplot; instead, the entire subplot or microplot should be classified according to the condition preventing occupancy (i.e. Census water, denied access, hazardous, etc.).

The table provided below can assist in locating subplot 2-4 from a subplot other than subplot 1.

Subplot Numbers		Azimuth	Backsight	Distance
From	To	degrees		feet
2	3	150	330	207.8
2	4	210	030	207.8
3	4	270	090	207.8

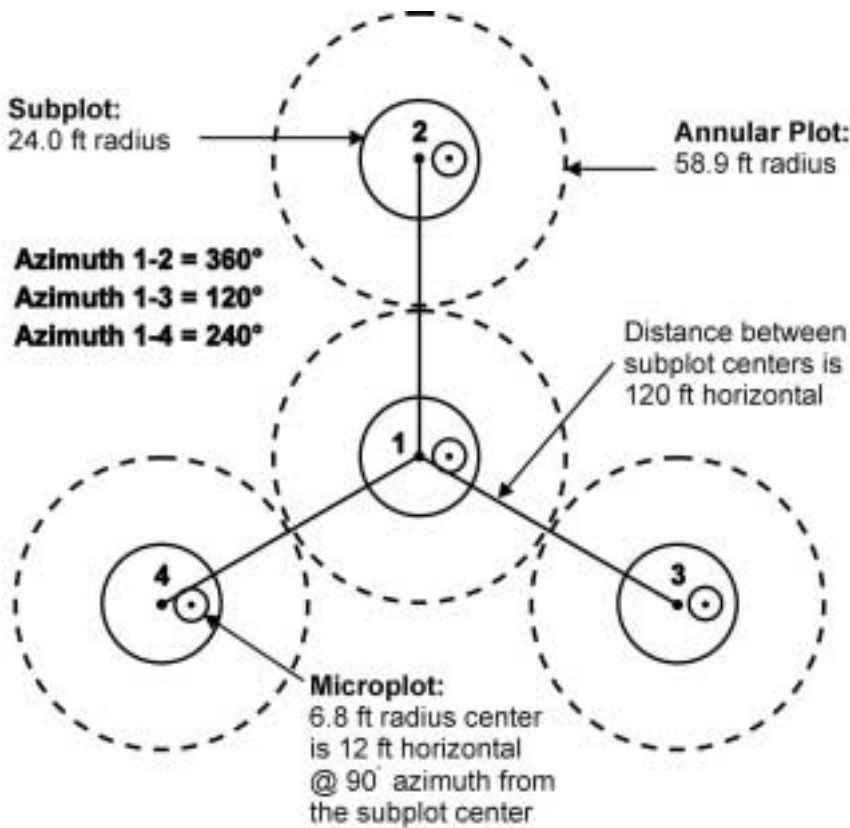


Figure 1. FIA plot diagram.

0.2 PLOT INTEGRITY

Each FIA program is responsible for minimizing damage to current or prospective sample trees and for specifying how these trees are monumented for remeasurement. The following field procedures are permitted:

- Scribing and nailing tags on witness trees so that subplot centers can be relocated.
- Boring of trees for age on subplots and annular plots to determine tree age, site index, stand age, or for other reasons.

All other potentially damaging procedures that may erode plot integrity are prohibited.

The following practices are specifically prohibited:

- Boring and scribing of some specific tree species, such as quaking aspen, that are known to be negatively affected (i.e., the initiation of infection or callusing).
- Chopping vines from tally trees. When possible, vines should be pried off trunks to enable accurate measure. If this is not possible, alternative tools (calipers, biltmore sticks) should be used.

0.3 OWNERSHIP INFORMATION

Ownership information is recorded on all accessible forest land conditions. Prior to actual fieldwork in a county, ownership data is collected from county courthouse records. It is important to gather as much information as possible on the initial visit to the courthouse to avoid a return visit while the fieldwork is occurring.

NOTE: If the ownership has changed either from or to National Forest, the state coordinator or field supervisor must be notified.

SURVEY SYSTEMS

There are two primary boundary surveys: metes-and-bounds and Public Land Survey (PLS). The metes-and-bounds method uses map and parcel whereas the PLS uses section, township, and range to describe boundaries. Field crews should become familiar with the method used in the state.

INITIAL COUNTY OVERVIEW

Review the county materials to determine which plots were forested on the previous survey. Also, determine if any of the plots were recorded as idle farmland, which may have reverted since the last inventory. In addition, examine the aerial photographs to determine other plot locations that may have reverted and/or partially sample forest land. Be sure to collect ownership information on these plots. Owner data is not required on nonforest plots.

COUNTY RECORDS

Record keeping systems varies both between and within states. Some counties are highly computerized, while some rely totally on paper. Some counties have up-to-date information, while others are outdated. It is always advisable to ask for help from courthouse employees. They are there to help the public and are generally eager to assist people. They can also be invaluable sources of information for local forest industries.

GENERAL OWNERSHIP PROCEDURES:

1. Determine if the plot location samples forest land. Keep in mind the plot layout. One or more of the subplots may sample forest land. This is where preliminary work is beneficial.
2. Locate the plot location on county courthouse tax maps using the aerial photograph. When available, rely primarily on the old photograph to locate the plot on the county tax maps. Also use the plot sketch from the previous survey. It may show distinguishing physical characteristics that may help delineate the ownership boundaries. If there is more than one parcel in the vicinity of the plot, record information for each possible parcel. The adjacent tract may be in another owner category or may help you gain access to the plot.
3. Record the name, address, and owner class for the owner of each parcel. Cross check the owner with the past survey to verify an actual ownership change or if either the current or previous assignment was in error.
4. Determine the total acreage of each parcel and the number of forest acres, if required. Woodland acres are broken out of the total acreage in some states and can be used to determine percent forest. In other states, however, pine plantations are included in the agriculture category. In these cases, use the aerial photograph and the field visit to estimate the percent forest of the tract. Field check the percent forest information when the plot appears to have been planted, naturally reverted, or land cleared.
5. Record all pertinent ownership information on the "Forest Land Ownership Classification" sheets and the "Sample Location Reference Page."

0.4 LOCATING SAMPLE PLOTS

Each crew should always consider weather forecasts, water levels, plot access, and state and corporate cooperation when working a county. Each county should be worked in the most efficient manner possible. Always contact National Forest System (NFS) district and county forest offices, and county sheriff, as soon as you enter the county. Contact the landowner and always let local people know who you are and what you are doing when leaving an official vehicle near a residential area.

STOP AT HOUSES, KNOCK ON DOORS, ETC. DO NOT DRIVE ACROSS CROPLAND, WILDLIFE CLEARINGS, YARDS, ETC. UNLESS YOU HAVE PERMISSION FROM THE LANDOWNER. PARK THE VEHICLE AND WALK. "POPPING" A LOCK OR USING A MASTER KEY WILL NOT BE TOLERATED. IF A ROAD HAS WATER-BARS OR A CABLE WITH A LOCK DO NOT DRIVE.

Fill out a sample location sheet (draw sheet) for all forested plots and non-forest plots whenever a non-forest plot has adjacent forestland close to the plot. This will insure that all 4 subplots are completely and totally within the non-forest condition. This will aid cruisers in the next survey to identify those plots that may have started to revert, but did not meet the required minimum stocking. In addition, this will allow check cruisers know exactly where PC was located in relation to the adjacent forestland. A sample location sheet is not required for intensification plots, although data from intensification plots are recorded in the data recorder or on hardcopy.

Each crew will be furnished with both new and old photos (when available), plot sheets, ownership and field classification sheets, county maps, and National Forest ownership maps. All non-forest plots and possible reversions (a sample location or a portion of a sample location that was non-forest in the previous inventory but now forest) must be chained in using the old photo pinprick. Correct the pinprick on the new photo after the field visit if needed. For intensification plots, only use the new photos. Do not make any corrections to the new photo for an intensification plot.

ACCESS TO STARTING POINT (SP)

In the Sample Location Reference page section "SP Location Sketch Map" sketch the route used to access the SP. Include location of the landowners' house, road names and numbers, obvious landmarks, and other prominent features that will aid the next field crew to locate the SP.

STARTING POINT

Select a permanent landmark or physical feature as the SP for locating the sample location. Intersections or sharp bends in roads, streams, or drainage ditches, field corners, prominent trees, and other features which can be readily identified both on the ground and on the photo make good starting points. The ideal starting point tree is a healthy, unique species, with unusual form, in a prominent location. At remeasurement relocations, the starting point on the old location sheet can often be used again. Scribe the SP tree with an "X" well above DBH (or well below depending on topography) and tag the tree at ground level, facing plot center.

Complete a new location sheet with the prior starting point information on land clearings, possible reversions that are chained into that do not meet minimum stocking levels, and on non-forest plots that are close to being partial plots. Copy the starting point information off the old sheets for any non-forest plots when the previous cruiser recorded the information. A starting point is not necessary if the plot center was non-forest during the past survey and all four subplots are obviously non-forest at the present time.

Note: No mark is needed on an SP if the point is permanent and readily identifiable, such as the corner of a building or a road intersection.

Reference a tree when possible.

Photo Azimuth and Distance

PHOTO WORK

A reference azimuth, angle of intersection, and azimuth to plot center are drawn on the photograph to aid in the establishment of an accurate course to sample location, verify placement of the pinprick, and ground check the office photo interpretation.

All plots except intensification plots must be drawn up on the new photograph to verify correct plot location. Note any corrected pinpricks on the front and back of the new photo.

Reference Azimuth

For a reference azimuth, select a straight road section, drainage ditch, field edge, or draw a line between two well-spaced landmarks. Avoid standing near metal objects, e.g., railroads or power line towers, since they can influence the compass reading.

If no linear features exist on the photo, GPS coordinates of two point features can be used to obtain a reference azimuth. Prior to driving to the sample location, identify two distinct features on the photo within a reasonable distance (usually 1-2 miles) from the sample location. At each point feature, record 180 fixes in averaging mode on the GPS receiver (GPS can only be utilized when error falls below +/- 70 feet). The reference azimuth, based on magnetic north, is determined by using the distance feature in the WP menu of the PLGR.

Measure the reference azimuth with a compass to the nearest degree and record on the tally sheet under starting point notes, disregarding magnetic declination. If the reference azimuth line and the azimuth to plot center do not intersect on the photo, draw a line perpendicular to the reference azimuth line making it cross the azimuth to plot center. Use the perpendicular as the new reference azimuth line after adding or subtracting 90.

Angle of Intersection

With a protractor measure the interior angle between the reference azimuth and azimuth to plot center arrows to the nearest degree. The interior angle should be between 20 degrees and 90 degrees. Record on the tally sheet under starting point notes.

Photo Notation

Note the following information on the **front** of the new photograph using a fine point marker for all plots:

- a. Reference azimuth line with an arrow indicating direction and azimuth noted.
- b. Course to plot azimuth line with an arrow indicating direction and azimuth noted.
- c. Starting Point circled and indicated as SP.
- d. GPS Way Point circled and indicated as WP for completely non-forest plots only.
- e. Interior angle noted with arrows drawn to the azimuth lines.
- f. Note which plots have corrected pinpricks.

Note the following information on the **back** of new photographs when plot center is nonforest (e.g., partials and completely nonforest plots), if the plot is completely inaccessible, and intensification plots:

- a. Plot number, if not already noted.
- b. Land use code at plot center. If land use is a hayfield, record cropland land use (11) and write “hay” next to the code number. If the land use is developed (30 series codes), write a short description of the type of development, e.g., “back yard”, “grocery store”, etc. This will aid the next crew to ensure the same area is re-evaluated.
- c. Date (mm/dd/yyyy).
- d. Cruiser and assistant initials and codes.
- e. Circle and note the “correct” pinprick if a correction has been made (do not move intensification pinpricks).
- f. Recording GPS coordinates of non-forest plots on the back of the photo is optional.

Also, note on the back of the new photograph if plot center is reverted or landcleared.

COURSE TO PLOT

The course to sample location can be determined by measurements from the photo for new plot locations, reversions, partials, or land clearings and lost plots when the SP has been removed. The azimuth and distance can be determined using GPS or compass and chain. Pacing to most locations is possible unless underbrush, water, or rough topography make pacing impractical. Pacing between SP and PC can be used to verify a previously reported course to sample location, but not for establishing a plot.

When old starting points are used at remeasurement locations, use the same distance and azimuth recorded in the previous survey with corrections necessary to account for declination and errant distances recorded by the previous crew. Accurate measurement of azimuth and distance from SP to PC can be by GPS navigation or by traversing on the ground.

ESTABLISHMENT OF SAMPLE KIND 1 LOCATIONS USING GPS

To begin, manually enter the plot coordinates in the GPS unit. The following list will walk you through the buttons to push to enter the coordinates:

1. WP
2. Use the right/left arrows to highlight ENTER and press the down arrow.
3. Note the WP number in the upper left corner of the screen. This will be the waypoint the coordinates are stored as and to which you will be navigating, so it is an important number. It is a good idea to change the waypoint number to coincide with the number of the plot you are installing. To do this, right arrow until the number is blinking. Hit NUM LOCK and using the keypad, enter the plot number. Hit NUM LOCK again to turn it off. Right arrow to the next line.
4. Right arrow over N to 90. Hit NUM LOCK and enter the coordinates for North/latitude. Once these numbers have been entered, hit NUM LOCK and right arrow to the next line. **Down arrow to change the E to a W.** This is critical! The GPS default is East. If you do not change this designation, you will be putting in and navigating to coordinates in the eastern hemisphere and unless you can swim really fast and really well, you don't want to do that! Once you have changed the E to a W, right arrow to the 000 and hit NUM LOCK. Enter the West/longitudinal coordinates.
5. Once the coordinates have been entered, turn off NUM LOCK and right arrow to the P. Down arrow to store the waypoint. It will be saved as the waypoint you designated earlier.

Next, click on NAV. Make sure that you are using either the CUSTOM or 2D FAST navigating method. The other word should be DIRECT. Right arrow to WP and enter the waypoint you want to navigate to. Right arrow to P and down arrow. The next screen will tell you where you need to go. The variables may not be the same for everyone, but you need to at least have AZ and RNG to tell you where you need to go and how far it is.

Using the GPS, navigate to within 100' – 150' of the plot. If possible, locate a good SP. Set the GPS down and press and hold down the POS button until the screen says AVG and the unit begins taking hits. Again, you must collect at least 180 points for the coordinates to be accurate. Once the GPS has reached at least 180, store the current position as a waypoint. Next, hit WP. Right arrow to DIST and down arrow. This screen will allow you to calculate an azimuth and horizontal distance between two waypoints. As the first waypoint, put in the coordinates you collected at the SP. The second waypoint is the plot coordinates. Once both have been entered, the GPS calculates the RNG and AZ from the first WP to the second WP. At this point, chain the horizontal distance and azimuth to establish plot center. Once you are at PC, put the GPS down and press and hold the POS key to begin averaging. Again, take at least 180 hits. Record these coordinates as the new plot coordinates.

WITNESS TREES

Reference two witness trees to subplot 1 when at all possible. In the absence of trees, use distinct objects such as fence corners, boulders, etc. If another subplot is referenced, be sure to note which subplot is monumented with witness trees.

Witness trees should be:

- a. Close to the pin and spaced approximately at right angles from the pin,
- b. Not likely to die or be cut within 5-7 years, e.g., pine sawtimber,
- c. A species easily located in the stand,
- d. At least 5 inches DBH (At least 2 inches DBH if no 5 inch DBH trees are present).
- e. If there are no witness trees, use whatever is available near the subplot center and describe its' relationship to the pin (e.g., large down log that you can tag, a large rock, etc.) and describe these on the sample location reference page.

Witness tree data:

- a. Species
- b. DBH to the last 0.1 inch
- c. Azimuth from pin to center of tree at ground level
- d. Horizontal distance to 0.1 ft from pin to center of tree

Mark the base of each witness tree with a metal tag (3 to 4 inches long) facing plot center. Scribe an "X" well above DBH facing the pin and be careful not to penetrate the cambium.

Mark one of the witness trees with a designated tag (venetian blind material) by nailing the tag at approximately six feet facing the line of approach from the SP. Record the color of the tag on the sample location page.

0.5 COUNTY EDIT PROCEDURES

The field is the most critical place to edit data for errors. Correcting the data in the field is more precise and accurate than doing so after being submitted to the office. For this reason, a careful field edit is a vital part of data collection.

Count all county materials and complete the Office Summary Sheet. Ensure that all materials are accounted for before starting the county. If anything is missing when you receive the county materials (i.e., old maps, any photos, plots sheets, etc.) let your field coordinator know.

Make sure all items are filled in on the on the Sample Location record. Check for starting point notes, azimuth and slope distance to the sample location, and that the SP description and Sketch to Sample Location match. Check completeness of the plot layout diagram, Location Sketch Map, and Sketch to Sample Location. Make sure all plots have a North arrow and

the Ownership is recorded. Check the witness tree information for completeness.

Check the photographs making sure that all the SP's are marked, the photographs are drawn-up, and all required information is recorded on the back of the photographs. Check math on course to plot azimuth, reference azimuth and angle of intersection.

Count all county materials and complete the Office Summary Sheet when finished. Ensure that all materials are accounted for before they are sent to the state coordinator or field supervisor for editing.